# MIXTURES OF PLASTIC ASSOCIATED CHEMICALS, HIGHLY CHLORINATED PCBs, CADMIUM AND MERCURY ARE RELATED TO ATHEROSCLEROSIS

**Erik Lampa**, *Occupational and Environmental Medicine, Uppsala University, Uppsala, Sweden*
**Lars Lind**, *Acute and Internal Medicine, Uppsala University Hospital, Uppsala, Sweden*
**Anna Bornefalk Hermansson**, *Uppsala Clinical Research Center, Uppsala, Sweden*
**Samira Salihovic**, *MTM Research Center, School of Science and Technology, Örebro University, Örebro, Sweden*
**Bert van Bavel**, *MTM Research Center, School of Science and Technology, Örebro University, Örebro, Sweden*
**P Monica Lind**, *Occupational and Environmental Medicine, Uppsala University, Uppsala, Sweden*

**Background and Aims:** We have previously shown that several environmental contaminants are related to atherosclerosis. In real life however, we are exposed to a mixture of contaminants. Therefore, the present study aims to investigate whether mixtures of environmental contaminants are related to atherosclerosis in the elderly.
**Methods:** We used the grey scale of the intima-media complex, which is a measure of the lipid infiltration in the vascular wall, as the outcome variable in a sample of 1016 subjects aged 70 years. Predictions were generated from a linear model with 15 contaminants (4 PCBs, 4 plastic associated chemicals and 8 metals), their pair-wise interactions and the established risk factors cholesterol, BMI, blood pressure, smoking, sex and diabetes using the elastic net. These predictions were used as the outcome in a model which was simplified using a backwards step-down procedure until 95% of the variance in the predictions was accounted for. Each variable's partial $R^2$ statistic was used as a measure of that variable's relative importance in the final model. PCBs 170 and 209 were used as markers for high-chlorinated PCBs.
**Results:** The interaction between Mono-methyl phthalate (MMP) and Cadmium was the most important (rank 5, partial $R^2$ = 3.8%) followed by the interactions between high-chlorinated PCBs and Cadmium (rank 7, partial $R^2$ = 2.2%) and high-chlorinated PCBs and MMP (rank 10, partial $R^2$ = 1.2%). An interaction of lesser importance between MMP and Mercury could also be seen (rank 14, partial $R^2$ = 0.5%). All interaction effects affected the grayness of the intima-media complex and had p-values < 0.001.
**Conclusions:** The present study is amongst the first to investigate effects of mixtures of environmental contaminants on human health. The main finding is that MMP and Cadmium, highly chlorinated PCBs and MMP and Cadmium as well as MMP and Mercury may act in synergy to influence atherosclerosis development.